

Interview Summary	Application No. 10/623,031	Applicant(s) SUTARDJA ET AL.	
	Examiner Leila Malek	Art Unit 2611	

All participants (applicant, applicant's representative, PTO personnel):

(1) Leila Malek. (3) _____.

(2) Andrew Fortney. (4) _____.

Date of Interview: 16 August 2007.

Type: a) ☐ Telephonic b) ☐ Video Conference
c) ☒ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☐ No.
If Yes, brief description: _____.

Claim(s) discussed: 1, 17, 30, 44 and 49.

Identification of prior art discussed: Alelyunas reference discussed.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicants' representative agreed to amend the claims to recite the allowable subject matters.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

DETAILED ACTION

Response to Arguments

1. Applicants' arguments filed on 10/24/2007, see pages 23 and 25-28, have been fully considered but they are not persuasive.

Applicants' Arguments: Applicants argue that Alelyunas does not disclose updating the LE and/or DFE coefficients with a filtered data term.

Examiner's Response: Examiner asserts that Alelyunas shows the coefficients of the filters have been updated with the filtered error term (see Fig. 5). Alelyunas further shows that the error signal is generated relative to the difference between the determined states of the decision mechanism of the DFE and the filtered communication signals from the LE (see Fig. 5 and column 2, last paragraph).

Therefore, inherently since the error signal has been generated based on the filtered data signal, the coefficients of the filters have been updated with the filtered data signal as well.

Applicants' Arguments: Applicants argue that there has been no admission that any part of the present application constitutes prior art.

Examiner's Response: The information cited in the specification's background of invention describes information as being known or conventional, which may be considered as an admission of prior art (see MPEP 704.11(b)). Applicants in the "Discussion Of The Background" disclose that Figs. 1 and 2 show conventional filtering processes, therefore, these figures can be considered as prior art.

Applicants' Argument, on page 27, regarding reference Lu is not persuasive, because Lu has been solely used to show that filtering means further comprises transposing a channel response to generate at least a subset of the first set of filter characteristics.

Applicants' Argument, on page 28, regarding reference Xia is not persuasive, because Xia has been solely used to show that the filters may comprise a matched filter.

2. Applicants' argument, see page 24, lines 9-12, with respect to claim 49 has been fully considered and are persuasive. The rejection of 49 has been withdrawn.

Drawings

3. The drawings were received on 10/24/2007. These drawings are accepted.

Claim Objections

4. Claim 19 is objected to because of the following informalities: in claim 19, "coefficients are derived from comprises" is vague. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 124, 126-129, and 132 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make

and/or use the invention. As to the above claims, there is no description in invention's disclosure, about the nature of the exact filter.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As to claim 36, Applicants recite "generating said error term further comprises convolving the error term". It is not clear how the error terms are used to generate error terms.

Claim 89 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 74, Applicant claims that the error term has been generated from an ideal equalized data signal. However in claim 89, Applicant recites that the error term has been generated from ideal filtered equalized data signal. This limitation contradicts the limitation of claim 74.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 30, 31, 38, 40-43, 74, 75, 80, 85, 91, 93, and 94, are rejected under 35 U.S.C. 102(b) as being anticipated by Alelyunas et al. (hereafter, referred as Alelyunas) (US 6,285,709).

As to claims 30 and 31, Alelyunas discloses a method for determining an adaptive algorithm (see column 2, last paragraph) for processing data, comprising the steps of: (a) processing a data sequence in accordance with the coefficients in the filter (see Fig. 5, the abstract) to produce a processed data sequence (i.e. output of the equalizer 86); (b) filtering the data sequence to generate a filtered data term for coefficients using the first set of filter characteristics (see linear equalizer); (c) detecting a sequence of the processed data sequence (receiving the processed data sequence by DFE has been interpreted as detecting a sequence of the processed data sequence) to generate an ideal processed data sequence (i.e. the output of the Decision Mechanism device); (d) determining a difference between the processed data sequence and the ideal processed data sequence to produce an error term (see Fig. 2, error term 70); (e) generating a filtered error term for the coefficients from the processed data sequence error term (see Fig. 5, out put of error filter), using at least a second set of filter characteristics structurally and/or functionally identical to the first set of filter characteristics (they are both equalizers, so they have the same (identical) functionally); and (f) updating the coefficients in the filter with each of the filtered data term and the filtered error term (see Fig. 5 and column 2, last paragraph (Alelyunas shows the coefficients of the filters have been updated with the filtered error term (see Fig. 5). Alelyunas further shows that the error signal is generated relative to the difference

between the determined states of the decision mechanism of the DFE and the filtered communication signals from the LE (see Fig. 5 and column 2, last paragraph).

Therefore, inherently since the error signal has been generated based on the filtered data signal, the coefficients of the filters have been updated with the filtered data signal as well.)).

As to claim 74, Alelyunas discloses an apparatus, comprising: (a) an equalizer 86 configured to equalize a data sequence in accordance with filter coefficients and provide an equalized data output (see the abstract); (b) a first filter (i.e. the combined FIR filter (filters 86 and 102)), configured to receive the data sequence and generate a filtered data term for updating the filter coefficients; and (c) means for providing a filtered error term (see the output of block 108) for updating the filtering coefficients, from the equalized data signal and an ideal equalized data (i.e. the output of the Decision Mechanism device) comprising a second means for filtering the equalized data signal (see equalizer 90), having filter characteristics structurally and/or functionally identical to the first means for filtering (they are both equalizers, so they have the same (identical) functionally); a means for processing the equalized data signal, configured to provide the ideal equalized data signal (see the output of the Decision Mechanism device); and a third means for filtering (see Fig. 2, the filter which has been placed at the output of Decision device) the ideal equalized data signal, having a subset of filter characteristics structurally and/or functionally identical to the first means for filtering (they are both equalizers, so they have the same (identical) functionally).

As to claims 38 and 91, Alelyunas further discloses that each of the first and second sets of filter characteristics comprises an error filter (see Filters 102 and 108).

As to claim 40, Alelyunas further discloses that the data sequence comprises a digital data signal (see column 4, line 14).

As to claim 41, Alelyunas further discloses step a) comprises equalizing the data sequence, wherein the processed data sequence comprises an equalized data signal (see Fig. 5), the filtered processed data sequence comprises a filtered equalized data signal, and an ideal filtered processed data sequence comprises an ideal filtered equalized data signal.

As to claims 42 and 93, Alelyunas further discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19).

As to claims 43 and 94, Alelyunas discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19). Inherently, this error must be at least a single bit error.

As to claim 75, Alelyunas further discloses that the equalizer comprises an adaptive finite impulse response filter (see column 3, lines 40-44).

As to claim 80, since equalizers and filters have the same functionality, inherently, the third set of filter characteristics comprising a subset of filter characteristics functionally identical to the first and second sets of filter characteristics.

As to claim 85, Alelyunas further discloses that the second means for filtering receives the equalized data signal and provides a filtered equalized data signal (see Fig. 5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 44-48, 130, 131, 133, 135, and 137-140 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alelyunas.

As to claim 44, Alelyunas discloses a method for determining an adaptive algorithm (see column 2, last paragraph) for processing data, comprising the steps of:

- (a) processing a data sequence in accordance with the coefficients in the filter (see Fig. 5, the abstract) to produce a processed data sequence (i.e. output of the equalizer 86);
- (b) filtering the data sequence to generate a filtered data term for coefficients using the first set of filter characteristics (see linear equalizer);
- (c) detecting a sequence of the processed data sequence (receiving the processed data sequence by DFE has been interpreted as detecting a sequence of the processed data sequence) to generate an ideal processed data sequence (i.e. the output of the Decision Mechanism device);
- (d) determining a difference between the processed data sequence and the ideal processed data sequence to produce an error term (see Fig. 2, error term 70);
- (e) generating a filtered error term for the coefficients from the processed data sequence

error term (see Fig. 5, out put of error filter), using at least a second set of filter characteristics structurally and/or functionally identical to the first set of filter characteristics (they are both equalizers, so they have the same (identical) functionally); and (f) updating the coefficients in the filter with each of the filtered data term and the filtered error term (see Fig. 5 and column 2, last paragraph (Alelyunas shows the coefficients of the filters have been updated with the filtered error term (see Fig. 5). Alelyunas further shows that the error signal is generated relative to the difference between the determined states of the decision mechanism of the DFE and the filtered communication signals from the LE (see Fig. 5 and column 2, last paragraph). Therefore, inherently since the error signal has been generated based on the filtered data signal, the coefficients of the filters have been updated with the filtered data signal as well.)). Alelyunas does not expressly disclose a computer-readable medium or waveform containing a set of instructions which, when executed by a signal processing device configured to execute computer-readable instructions, is configured to perform the method of claim 44. However, it would have been obvious to one of ordinary skill in the art at the time of invention to use a computer-readable medium to store a set of instructions and transfer such instructions to the receiver to carry out the data processing on the received signal.

As to claim 45, Alelyunas further discloses that the coefficients are for an adaptive finite impulse response (FIR) algorithm (see column 3, lines 40-44).

As to claim 46, Alelyunas further discloses that the coefficients are derived from a least-mean-squares (LMS) gradient algorithm (see column 4, line 17).

As to claim 135, Alelyunas discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19). Although Alelyunas does not expressly disclose that the error is a dibit error, however it would have been clearly recognizable to one of ordinary skill in the art that the error could be a signal bit error or a multi-bit error.

As to claim 47, Alelyunas further discloses that the data sequence comprises a digital data signal (see column 4, line 14). Therefore, inherently the set of instructions comprises binary code.

As to claim 48, Alelyunas further discloses that the data sequence comprises a digital data signal (see column 4, line 14).

As to claim 130, Alelyunas further discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19).

As to claim 131, Alelyunas discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19). Inherently, this error must be at least a single bit error.

As to claim 133, Alelyunas discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19). Although Alelyunas does not expressly disclose that the error is a dibit error, however it would have been clearly recognizable to one of ordinary skill in the art that the error could be a signal bit error or a multi-bit error.

As to claim 137, Alelyunas further discloses that step (c) further comprises convolving the error term with the second set of filter characteristics (DFE) to generate the filtered error term (see Fig. 5).

As to claim 138, Alelyunas further discloses that each of the first and second sets of filter characteristics comprises an error filter (see Filters 102 and 108).

As to claim 139, Alelyunas further discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19).

As to claims 140, Alelyunas discloses that the first and second sets of filter characteristics are configured to minimize a dominant error type (see column 4, lines 17-19). Inherently, this error must be at least a single bit error.

9. Claims 77, 79, 81, 87, and 90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alelyunas, in view of background of invention.

As to claim 77, Alelyunas discloses all the subject matters claimed in claim 77, except that the signal processor comprises a sequence detector configured to provide a sequence detected equalized data output. Applicant in the background of invention shows that the output of the FIR filter 12 has been detected by sequence detector 14. Applicant in the background of invention further discloses convolving the detected processed data sequence with a third set of filter characteristics to generate the ideal filtered processed data sequence (see Target filter 16). It would have been obvious to one of ordinary skill in the art at the time of invention to use a sequence detector to generate an ideal, noiseless data signal from the equalizers (see paragraph 0003).

As to claims 79, 81, and 87, Alelyunas discloses all the subject matters claimed in the above claims, except that the third means for filtering comprises a target filter. Applicant in the background of invention further discloses convolving the detected processed data sequence with a third set of filter characteristics (i.e. a target filter) to generate the ideal filtered processed data sequence (see Target filter 16). It would have been obvious to one of ordinary skill in the art at the time of invention to use a target filter to generate an ideal, noiseless data signal from the equalizers (see paragraph 0003).

As to claim 90, Alelyunas further discloses that the subtractor is configured to subtract one of the equalized data output and the ideal equalized data output from the other of the equalized data output and the ideal equalized data output (see Fig. 5).

10. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alelyunas, in view of Lu (US 6,768,796).

As to claim 39, Alelyunas discloses all the subject matters claimed in claim 38, except that filtering further comprises transposing a channel response to generate at least a subset of the first set of filter characteristics. Lu discloses a method and system for echo (noise, error) cancellation in a communication network (see the abstract). Lu further discloses that an adaptive filter 408 generates and updates filter tap coefficients vector 408 to model the characteristics impulse response of the echo channel 402, so that the far end signal can be adaptively filtered to create a local replica of the far end echo, or an echo estimate signal (see column 8, lines 29-38). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Alelyunas as

suggested by Lu to estimate the echo signal and therefore cancel the noise (echo) more accurately.

11. Claim 92 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alelyunas, in view of Xia et al. (hereafter, referred as Xia) (US 2002/0097795).

As to claim 92, Alelyunas discloses all the subject matters claimed, except that the first and second filters comprise a matched filter. Xia, in the same field of endeavor, discloses an equalizer 120 which comprises a matched filter 321 (see Fig. 3) to permit synchronization even with multiple, arbitrarily strong ghosts caused by strong multipathing, multiple transmitters, or both. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Alelyunas as suggested by Xia for the reasons stated above.

Allowable Subject Matter

12. Claims 1-6, 9-22, 25-29, 49-51, 53, 54, 61, 63-73, 97-103, 106-113, 115-123, 125 and 134 are allowed. The following is a statement of reasons for the indication of allowable subject matter:

As to claims 1, 17, and 49, a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method for adaptively updating coefficients in a filter for processing data, comprising the steps of: receiving a data sequence in the filter and processing the data sequence in accordance with the coefficients in the filter to produce a processed data sequence; filtering the data sequence with a first set of filter characteristics to generate a filtered data term for the coefficients; filtering the processed data sequence using a second set of filter characteristics, the second set of

filter characteristics being structurally and/or functionally identical to the first set of filter characteristics; generating a filtered ideal processed data sequence from the processed data sequence using a third set of filter characteristics, the third set of filter characteristics comprising a subset of filter characteristics structurally and/or functionally identical to the first filter characteristics; generating a filtered error term for the coefficients from the filtered processed data sequence and the filtered ideal processed data sequence; and updating the coefficients in the filter with each of the filtered data term and the filtered error term.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leila Malek whose telephone number is 571-272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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